

**We Claim:**

- 1) A process for delivering a polynucleotide complexed with a compound into an extravascular muscle cell of a mammal, comprising:
  - a) mixing the polynucleotide and a polymer to form a complex wherein the zeta potential of the complex is not positive;
  - b) inserting the polynucleotide into a mammalian blood vessel, *in vivo*;
  - c) increasing the permeability of the blood vessel;
  - d) passing the complex through the blood vessel;
  - e) delivering the complex into the mammalian muscle cell; and,
  - f) expressing the polynucleotide.
- 2) The complex of claim 1 wherein the complex is delivered to the cell by inserting the polynucleotide into a mammalian vessel;
- 3) The complex of claim 4 wherein the complex is delivered to the cell by increasing the permeability of the vessel;
- 4) The process of claim 1 wherein increasing the permeability of the vessel consists of increasing pressure against vessel walls.
- 5) The process of claim 4 wherein increasing the pressure consists of increasing a volume of fluid within the vessel.
- 6) The process of claim 5 wherein increasing the volume consists of inserting the polynucleotide in a solution into the vessel.
- 7) The process of claim 1 wherein the muscle cell is a skeletal muscle cell.
- 8) The process of claim 7 wherein the skeletal muscle cell is a limb muscle cell.
- 9) The process of claim 1 wherein the compound is selected from the group consisting of histone, PEI, cationic lipid, poly-L-lysine, histone-lipid, histone-polyamine, and protamine.

- 10) The process of claim 1 wherein the zeta potential of the complex is negative.
- 11) A complex for *in vivo* polynucleotide expression, comprising: a combination of at least two compounds characterized by the complex zeta potential which is not positive and ability to facilitate delivery of a polynucleotide to a cell where it is expressed.
- 12) The complex of claim 11 wherein the cell is selected from the group consisting of liver cells, heart cells, and muscle cells.
- 13) The complex of claim 12 wherein the muscle cell consists of a skeletal muscle cell.
- 14) A process for delivering a polynucleotide complexed with a compound into an extravascular liver cell of a mammal, comprising:
  - a) mixing the polynucleotide and a polymer to form a complex wherein the zeta potential of the complex is not positive;
  - b) inserting the polynucleotide into a mammalian blood vessel, *in vivo*;
  - c) increasing the permeability of the blood vessel;
  - d) passing the complex through the blood vessel;
  - e) delivering the complex into the mammalian muscle cell; and,
  - f) expressing the polynucleotide.
- 15) The process of claim 14 wherein the liver cell consists of an hepatocyte.
- 16) The complex of claim 15 wherein the complex is delivered to the cell by inserting the polynucleotide into a mammalian vessel;
- 17) The complex of claim 16 wherein the complex is delivered to the cell by increasing the permeability of the vessel;
- 18) The process of claim 17 wherein increasing the permeability of the vessel consists of increasing pressure against vessel walls.

- 19) The process of claim 18 wherein increasing the pressure consists of increasing a volume of fluid within the vessel.
- 20) The process of claim 19 wherein increasing the volume consists of inserting the polynucleotide in a solution into the vessel.
- 21) The process of claim 14 wherein the compound is selected from the group consisting of histone, PEI, cationic lipid, poly-L-lysine, histone-lipid, histone-polyamine, and protamine.
- 22) The process of claim 14 wherein the zeta potential of the complex is negative.